Proceedings of the 30th Annual Conference of IAMSLIC
Ed. by J.W. Markham & A.L. Duda), pp. 31-59.
Fort Pierce, FL : IAMSLIC.

French voyages of exploration and science in the Age of Enlightenment: an ocean of discovery throughout the Pacific Ocean

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Abstract:

A time when France, as well as Great Britain, had a very ambitious maritime policy, the La Pérouse expedition was the only maritime expedition conceived, designed and followed at a national level by the King himself, Louis XVI.

The excellence of the Expedition's preparation and of its importance in terms of scientific results, the exceptional concern of La Pérouse in the fields of data gathering and transmission, his very high quality as captain of a global expedition, made it a remarkable achievement, despite its disastrous end.

Keywords: Pacific Ocean; Tasmania; Oceania; north-east Asia; north western America; voyages of discovery; voyages of exploration; Age of Enlightenment; La Pérouse; Cook; D'Entrecasteaux.

To cite this article: Melguen, Marthe. 2005. French voyages of exploration and science in the Age of Enlightenment: an ocean of discovery throughout the Pacific Ocean. In: Voyages of Discovery: Parting the Seas of Information Technology: Proceedings of the 30th Annual Conference of the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) (ed. by J.W. Markham & A.L. Duda), pp. 31-59. Fort Pierce, FL : IAMSLIC.

FRENCH VOYAGES OF EXPLORATION AND SCIENCE IN THE AGE OF ENLIGHTENMENT: AN OCEAN OF DISCOVERY THROUGHOUT THE PACIFIC OCEAN

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INTRODUCTION

In this revolutionary time of information technology, tending to make data collected on ocean research cruises available internationally in real time, and providing research vessels with electronic mapping and navigational devices, it is both interesting and useful to recall the conditions under which the results of 18th century maritime expeditions were gathered and transmitted. This was a prime century in terms of voyages of discovery.

For reasons related to current events, including the opening of the La Pérouse library in Brest and the 30th IAMSLIC Conference held in Tasmania, we have selected amongst them the voyages of discovery made in the Pacific Ocean, and especially those of La Pérouse and D'Entrecasteaux.

This approach will notably lead to a brief explanation of the reasons which led to the symbolic choice of Captain La Pérouse's name for the above-mentioned Library.

It will also allow us to highlight some of the links which have existed between France and Tasmania since the 18th century.

So, we shall review the following, in turn:

- The characteristics of the Age of Enlightenment in France, including its impact on science and voyages of discovery,
- The state of knowledge, with regard to the Pacific Ocean, at the turn of that century,
- The main voyages of discovery which took place during that same century,

- the specificity of the voyages made by La Pérouse and D'Entrecasteaux, as well as their principal contributions to our knowledge of this Ocean,
- The reasons for the choice of a symbol for the name of the Marine documentation centre in Brest.

THE AGE OF ENLIGHTENMENT AND ITS IMPACT ON SCIENCE AND VOYAGES OF DISCOVERY.

The refers to the period in the 18th century going from 1715 to about 1789. This period was particularly marked by philosophical rationalism and the exalting of science.
The expression of the was often used by the philosophes of the time, which included Voltaire, Diderot, Montesquieu and Rousseau, who where convinced that after a long period of obscurantism related to the hold that religion had on minds, they were entering a new age which was illuminated by reason and science (Gaziello, 1984; Bourde, 1999). This intellectual revolution came after Newton's discovery of universal gravity in 1686: which had made a considerable impression on society at the time. They came to think, that a wise use of reason would open the perspective of perpetual progress in the fields of knowledge, technical achievements and moral values. This state of mind was accompanied by a thirst for encyclopaedic knowledge.

All the aspects of the Enlightenment's thought, were gathered in the Encyclopaedia» published between 1751 and 1772, under the co-direction of Diderot and the mathematician d'Alembert. This was a gigantic piece of work, with over 20 volumes and containing nearly 72,000 articles. It was intended to take stock of human knowledge in every field and to make it accessible. Amongst the authors of the articles were the above-mentioned philosopers and a number of scientists, including Buffon. Their credo, as expressed in the famous "preliminary discourse" written by d'Alembert as a preface, could be summed up as: «All things must be examined, debated, investigated without exception and without regard for anyone's feelings» (Bourde, 1999).

Furthermore, the encyclopaedic spirit was looking for universality, openness to the world, beyond the frontiers of European civilisation (Gaziello, 1984).
The philosophes were curious about everything, and thus were interested in the far-ranging expeditions, of which the voyages to circumnavigate the globe, which enjoyed renewed interest in the second half of the 18th century. Thus, travel stories occupied an important place in the libraries of the cultivated (Richard, 1986; Bourde, 1999).

This philosophy had a major influence on the elite of the time. Science had become a fashion, in fact, it was quite the rage. Aristocrats bought themselves physics cabinets and laboratories. They carried out their own experiments. The bourgeois grew interested in natural sciences and collected, amongst other things, plants, shells and stones. The influence of learned societies was also considerable. Thus favoured in all the wealthy and enlightened circles, science found patrons amongst the sovereigns (Dunmore, 1986).

In France, Louis XV (1715-1774) possessed two physics cabinets. He supported Kerguelen's second voyage of discovery sailing for southern lands. He fitted out the expedition with the latest available navigational instruments and entrusted him with a vast programme for observation (Gaziello, 1984). Louis XVI (1754-1793) was interested in the exact sciences, from his childhood on (Girault de Coursac, 2000). Keen on geographical discoveries, and above all those related to Captain Cook's voyages, he was one of the main initiators and designers of La Pérouse's voyage in the Pacific Ocean (Girault de Coursac, 2000).

In England, Germany and Holland as well, the monarch's kept up significant scientific cabinets (Gaziello, 1984). The Enlightenment movement went beyond all frontiers. It reached all of the cultured elites of Europe, and its language was French (Fumaroli, 2001).

Consequently, the spirit of Enlightenment contributed to stimulating an all-out search for knowledge on an international scale. It greatly fostered the development of voyages of discovery, and influenced the content of their programmes of observation (Gaziello, 1984; Dunmore, 1986; Boulaire, 2003).

THE STATE OF KNOWLEDGE, WITH REGARD TO THE PACIFIC OCEAN, AT THE START OF THE 18TH CENTURY.

At the turn of the 18th century, the Pacific Ocean, for the most part, remained to be discovered (Dunmore, 1965; Dunmore, 1978; Taillemite, 1987; Cazaux, 1995 ; Jacob, 1995 ; Encyclopédie Kléio, 2001).
The great maritime expeditions which had taken place before had not concerned it much. Indeed, Christopher Colombus, had discovered, during four voyages, one of the Bahamas islands (1492), Haiti (1493), Trinidad (1498) and the Coast of Honduras (1502). At the same period, the Dutch had settled the Dutch Indies. In 1511, Magellan had opened the route toward the Molucca (Spice) islands with the taking of Malacca. He had also discovered, in 1520, the straits which bear his name, and had entered the Pacific by the East. He next reached the archipelago of the Marianas, or Ladrone islands, and then the Philippines where he died in march 1521. In 1522, however, one of his ships completed his sail round the world, rounding the cap of Good Hope.
A long, uneventful period followed this great time of discovery, up until the 18th century. Thus, at the start of the Century of Enlightenment, only the coastal fringes of the «Old World» (Asia, Africa, Europe) and the «New World» (the Americas) were known (Boulaire, 2003).
As for the Pacific, two areas in particular, remained unknown: «Terra Australis» and the North and South poles. They were amongst the most important objectives for voyages of discovery in the Enlightenment period (Taillemite, 1987; Boulaire, 2003).

THE MAIN VOYAGES OF DISCOVERY IN THE PACIFIC, DURING THE ENLIGHTENMENT

Two voyages marked the first half of this century, i.e. those of:

- the Dutch sailor, Jacob Roggeven, who discovered Easter Island and the Samoan islands in 1722 (Dunmore, 1978; Encyclopédie Kléio, 2001),
- Admiral George Anson, who, from 1740 to 1744, during an expedition against the Spaniards, aboard the «Centurion» sailed round the world: on a voyage full of geographical observations (Encyclopédie Kléio, 2001).

The other voyages, which brought more discoveries, took place in the second half of the century, after the end of the Seven Years War (1763) which led to France's losing Canada and part of India. As well as the scientific objectives, which we will discuss later, these voyages were highly orientated towards discovering new territories, which were important for developing trade.

In chronological order, they were those of the following explorers:

1. Wallis and Carteret (1766-1769)

After leaving together in 1766 aboard the «Dolphin» and the «Swallow», they lost sight of each other in a storm leaving the Straits of Magellan (Cazaux, 1995; Jacob, 1995; Gauthey, 2004).
Walllis was the first to land at Tahiti and discover the «Noble savages» that the philosophes of the Age of Enlightenment had imagined.
This was an important point for the time, but was undermined by the fact that his story of the voyage was only published after those of Bougainville and Cook.
As for Carteret, he explored the equatorial parts of the «Great Ocean» (the Pacific), discovered Pitcairn island and a few of the Tuamotu islands, then sailed along the coasts of New Holland (Australia) seeking the legendary «Terra Australis».

2. Bougainville (1766-1769)

Bougainville's was the first French voyage round the world (Dunmore, 1965; Dunmore, 1978; Cazaux, 1995).
Bougainville left Brest in 1766, aboard the frigate called «La Boudeuse», accompanied by «L'Etoile». He sailed through the Straits of Magellan then landed in Tahiti in 1768.
Although of limited scope, the scientific contribution of this voyage deserves further examination it for the following reasons:

- The fact that, for the first time, longitudes at sea were systematically observed. Throughout the voyage, Bougainville used the method to calculate longitudes using lunar distances (Girault de Coursac, 2000; Bellec, 2001). This enabled

him to re-adjust the map of the «Great Ocean», whose expanse in longitude had been very sketchy until then.

- On the other hand, the account of this voyage presented Tahiti as a paradise of the Southern seas: a paradise which fit the vision of the Enlightenment philosophes, and especially that of Rousseau, who thought that Man was born naturally good and was corrupted by Society. This pleasant and popular, more literary than scientific, travel story was in harmony with the climate of the time. Moreover, it provided important lessons which were useful when future exploratory expeditions were organised (Jacob, 1995; Gauthey, 2004).

At the time, women were not allowed on board. However, Bougainville unknowingly took Jeanne Barret, the assistant to one of the scholars sailing with him, aboard. To succeed in this, she had to dress up as a man. Nearly a century later, Rose Freycinet came on board under similar conditions, but dressed up as sailor, to assist her husband who was Commander in chief of the mission. In spite of being a woman, she did not disturb the expedition and was indeed inofficialy admitted on board by the Navy.

3. Cook (1768-1780)

Over a twelve year period, Cook achieved three voyages of discovery (Cook, 1980; Gaziello, 1984):

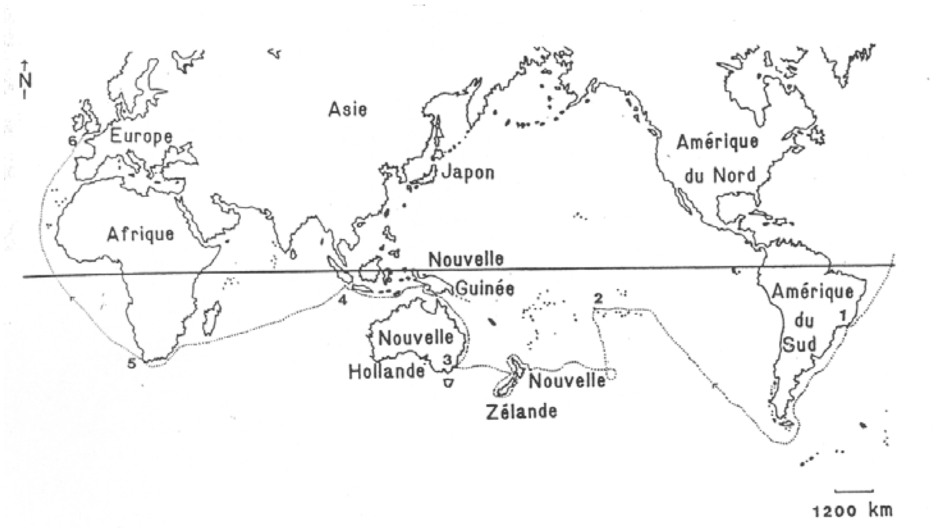
- The first (1768-1771; Fig. 1, in Gaziello, 1984), aboard the «Endeavour»
- the second (1772-1775; Fig. 2, in Gaziello, 1984), on the «Resolution» and «Adventure»,
- and the third (1776-1780; Fig. 3, in Gaziello, 1984) aboard the «Discovery» and «Resolution».

Cook's discoveries were considerable (Gaziello, 1984; Richard, 1986; Gauthey, 2004). Indeed, through these three voyages, the navigator:

- Explored New Zealand and the Western coast of New Holland,
- Discovered New Caledonia,
- Proved that the famous «Southern continent» did not exist, unless at very high latitudes,
- Entered the Arctic ocean by way of the Bering Strait, and showed that a passage from the Pacific to the Atlantic via Northern America was impossible,
- Discovered the Sandwich Islands (Hawaii) and, following this discovery, demonstrated that the inhabitants of Polynesia shared ethnic unity.

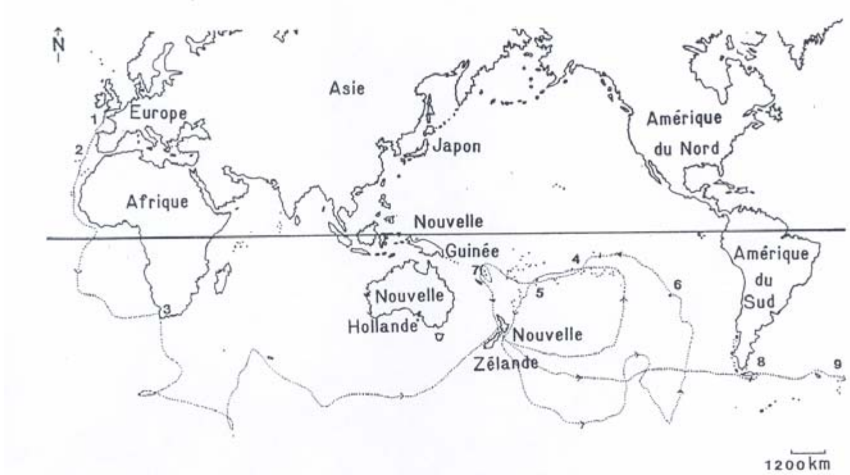
Unfortunately, he was assassinated by natives in Hawaii in 1779.

Fig. 1: Cook's first voyage (1768-1771)



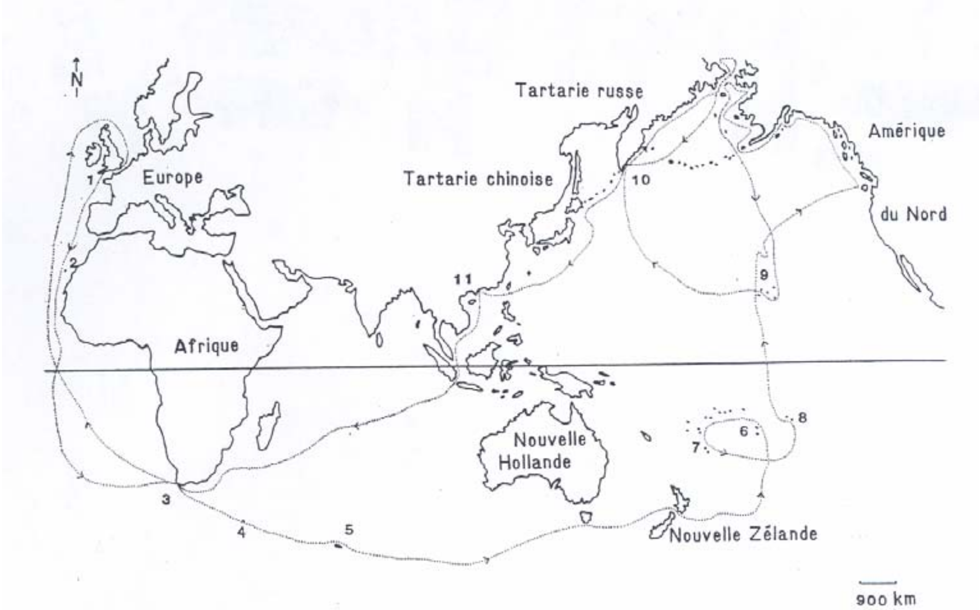
1. Rio de Janeiro – 2. Society islands – 3. Botany Bay – 4. Prince Edward island – 5. The Cape – 6. Dover

Fig. 2: Cook's second voyage (1772-1775)



1. Departure from Plymouth – 2. Madeira – 3. The Cape – 4. Society Islands – 5. Friendly islands (Tonga) – 6. Easter islands – 7. New Hebrides – 8. Staten island – 9. Return to Portsmouth

Fig. 3: Cook's third voyage (1776-1780)



1. Departure from Plymouth – 2. Tenerife – 3. The Cap – 4. Marion island – 5. Kerguelen island – 6. Hervey islands – 7. Tonga – 8. Society islands – 9. Sandwich islands – 10. Petropavlosk – 11. Macao

4. La Pérouse (1785-1788)

In 1785, i.e., five years after the end of Cook's voyage, Louis XVI launched one of the greatest discovery expeditions of the Age of Enlightenment (Girault de Coursac, 2000). This expedition was to enable France to rival England, in the field in question, and remained the largest French expedition to the Pacific in the 18th century. Its ambition, in addition to opening new sea routes and trading posts, was:

- To rectify and perfect the charting of the «Great Ocean»,
- To add to the knowledge and scientific collections of the time, in keeping with the expectations of the intellectual elite of the time.

The main areas of exploration initially planned (see Fig. 4) were located along the Northwestern coast of America, the coasts of Kamtchatka and Japan, New Guinea and New Holland (Gaziello, 1984). This led to a vast sailing programme (see Fig. 5; in Gaziello, 1984).La Pérouse (1741-1788) set sail from Brest in August 1785 aboard «La Boussole» store ship, accompanied by «l'Astrolabe» commanded by Fleuriot de Langle (La Pérouse, 1981).The actual route of his voyage, whose chronological order differed from that of the initial project (see Fig. 5) is shown below in Figure 6 (Gaziello, 1984).

Fig. 4: Project for La Pérouse's expedition in 1785: main areas of exploration planned

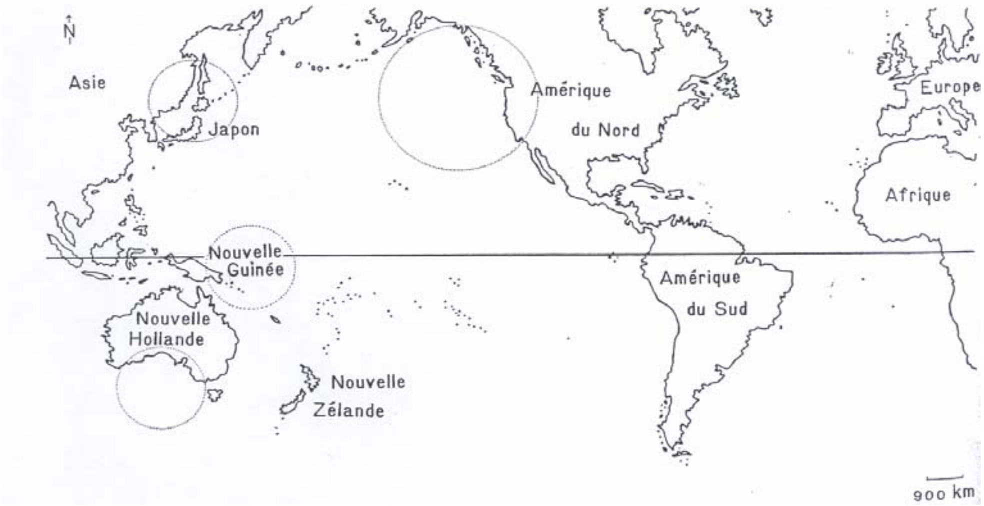
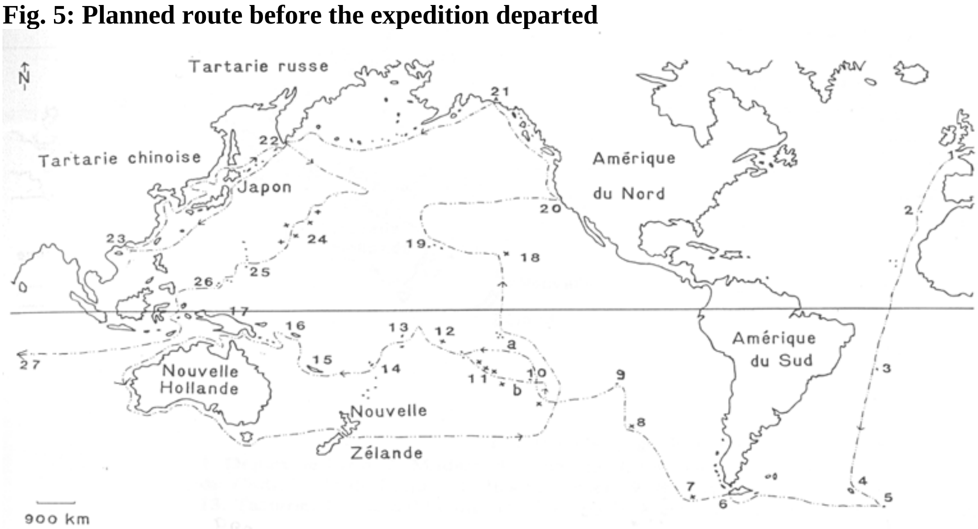
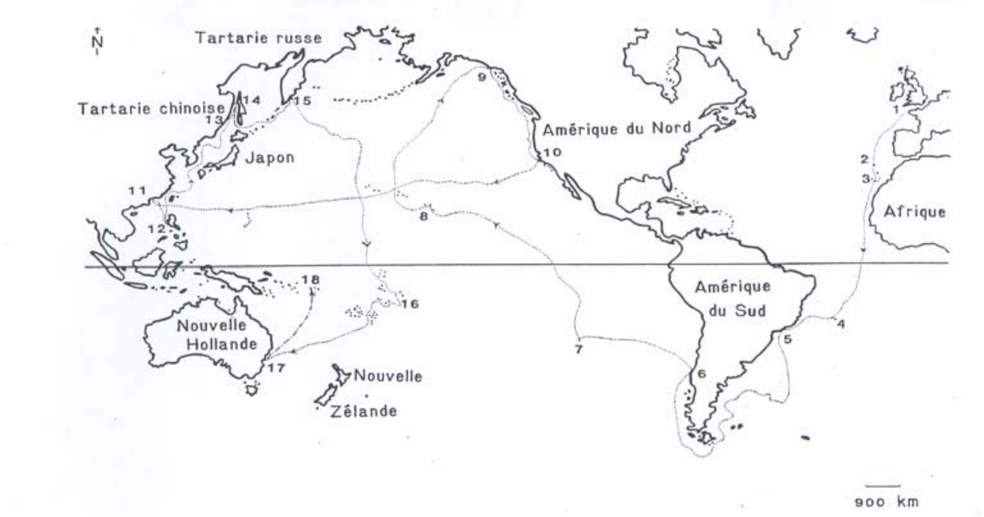


Fig. 5: Planned route before the expedition departed



Departure from Brest – 2. Madeira – 3. Trinidad – 4. Georgia island – Sandwich's land – 6. Tiera del Fuego – 7. Drake's land – 8. Islands discovered by the Spanish – 9. Easter islands – 10. Pitcairn island – 11. Islands discovered by the Spanish – 12. Society islands – 13. Navigator islands – 14. Friendly islands – 15. New Caledonia – 16. Terre des Arsacides (Solomon islands) – 17. New Guinea – 18. Islands discovered by the Spanish – 19. Sandwich islands – 20. Monterey – 21. Mount St. Elias – 22. Petropavlosk – 23. Macao – 24. Islands discovered by the Spanish – 25. Mariana islands – 26. Molucccas (Spice islands) – 27. Return to France.

Fig. 6: La Pérouse's voyage (1785-1788): route actually taken



Departure from Brest – 2. Madeira – 3.Tenerife – 4. Trinidad – 5. Santa Catarina, Brazil – 6. Concepcion, Chile – 7. Easter island – 8. Sandwich islands – 9. Baie des Français (Lituya bay) – 10. Monterey – 11. Macao – 12. Luzon – 13. Tartary – 14. Sakhalin island – 15. Petropavlosk – 16. Navigator islands – 17. Botany Bay – 18. Vanikoro

The main steps of this voyage were as follows (La Pérouse, 1981; Gaziello, 1984; Dunmore, 1986; La Pérouse, 1997; Taillemite, 2002):

- **1785** : Sailing from Brest to the south of South America, by way of Madeira, Tenerife, Trinidad and Saint Catherine,
- **1786**: The voyage continued, from Cape Horn to the Sandwich islands (Hawaiian islands), putting into port in Chili and on Easter island. Exploring the Sandwich islands, then sailing up to Alaska, before coming down the American coastline as far as California. Crossing of the Pacific to Macao.
- **1787** : Sailing back northward, with a call in port in Manilla. Navigating along the Formosa coasts (Taiwan) and sailing into the Seas of China and Japan. Discovery of the Straits bearing his name, between the islands of Hokkaido and Sakhalin, then putting in at Kamtchatka. Redescending towards New Holland, by way of the Navigator islands (Samoan isles, where the Commander of the «Astrolabe» was assassinated), and the Friendly islands (Tonga).
- **1788** : After a stay in New Holland (Botany Bay, their last known call), they set sail for the North-East. Their objective was to explore the southern part of New Caledonia, sail up to the Friendly islands (Tonga), the islands of Santa Cruz (Solomon isles), then to head for the "Ile de France" (Mauritius).
  After leaving Bontany Bay in March 1788, the expedition was lost with all hands near the island of Vanikoro.

This disappearance remained a mystery for nearly forty years, in spite of the search carried out in 1792 by the D'Entrecasteaux expedition: this voyage had been decided on by the National Assembly, at the request of the Natural history society, mobilised to find the scholars who had sailed on the voyage (Gaziello, 1984; Richard, 1986).

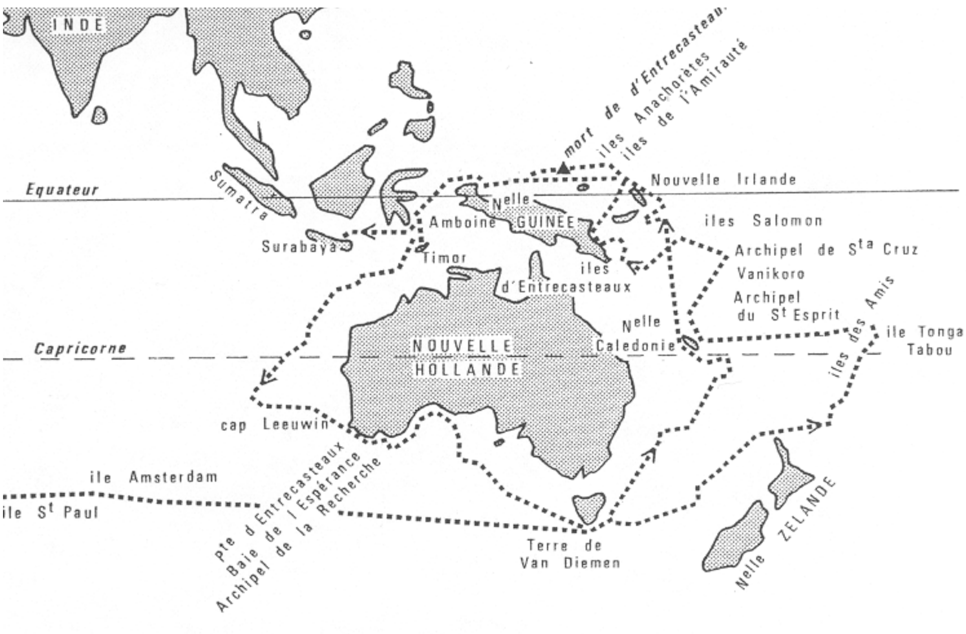
As for D'Entrecasteaux's expedition, addressed below, we shall try, in on of the following paragraphs of the paper, to highlight the main contributions of La Pérouse's voyage to science and to the knowledge of the Pacific Ocean.

5. D'Entrecasteaux (1791-1793)

After being successively in charge of a cruise in China in 1785, and governor of the isles of France (Mauritius) and Bourbon (Reunion island) from 1787 to 1790, D'Entrecasteaux was chosen to lead the mission to find the La Pérouse expedition. He left Brest in 1791, aboard the frigate «La Recherche», accompanied by «l'Espérance», commanded by De Kermadec.

The main stages of his voyage, shown in Figure 7 (Richard, 1986), were as follows :

Fig. 7: D'Entrecasteaux's voyage in the Pacific (1791-1797)



- **1791** : Heading towards the Pacific, by way of the Cape of Good Hope, with calls in Tenerife and at The Cape. Reconnoitering of Amsterdam and Saint Paul islands, then once again setting course towards the southern vicinity of New Holland.
- **1792 – 1793 :** Reconnoitering of Van Diemen's Land (Tasmania), which he sensed was an island, then the South Coast of New Caledonia and that of New Ireland. Heading towards the Moluccas (Spice Islands) with a call in Amboine to repair the ships and renew their supplies, then towards the Southwestern coasts of New Holland, before sailing back up towards the Tonga isles, then towards New Caledonia (where the Commander of «l'Espérance» died). Finally, they sailed northwards, to the Archipelago of Santa Cruz (Solomon islands), before reconnoitering the North Coast of New Guinea, where D'Entrecasteaux, sapped by scurvey and dysentery, died in July 1793. He was replaced at the head of the expedition by D'Auribeau. On the trip home, the expedition ended at Surabaya (Indonesia) where the Dutch, who were at war with France, seized the two vessels (Taillemite, 2002).

Due to the ships being captured and sold, the official results of the expedition, which were demanded to be returned to D'Auribeau on board, only reached France in 1802. This situation deprived Nicolas Baudin, who left for New Holland in 1800, of the better part of the information gathered by his predecessor. In fact, at the time, only the "account of the voyage" published by La Billardière, was available. The latter was the botanist of the expedition, who had kept his personal diary of the cruise when he returned to France, in spite of the Commander's instructions.
Although D'Entrecasteaux's expedition failed in terms of his humanitarian mission, this was not the case for its scientific results. For these, as we shall see, also made his one of the great voyages of discovery of the Pacific Ocean.

The related scientific results are presented in Denis Abbott's paper, hereafter.

6. Baudin (1800-1804)

The exploratory voyage in the Pacific led by Nicolas Baudin and supported by Napoleon I, was mainly devoted to exploring the West Coast of New Holland.
The expedition's two vessels, the «Géographe » and the «Naturaliste», with some twenty scholars on boat, explored this coastline at length, then, after a call in Timor, arrived in Tasmania.

The scientific consequences of this voyage were of prime importance (Jacob, 1995; Taillemite, 2002). They were especially characterised by the fact that over 23,000 samples of plants and animals were brought back and distributed in France. For instance, the Museum had never received such a large number of samples before. Amongst the seeds brought back, those from Australia were rapidly sown in gardens.

THE SPECIFICITIES OF LA PÉROUSE'S VOYAGE OF DISCOVERY, INCLUDING HIS MAIN CONTRIBUTIONS TO KNOWLEDGE OF THE PACIFIC OCEAN

As previously mentioned, as concerns the Pacific Ocean, this expedition was amongst the most important voyages of discovery in the Age of Enlightenment.

Without entirely leaving its political and economic objectives unmentioned, we will more particularly try to put forward:

- The scientific objectives and the conditions under which they were, or were not, reached,

- The results obtained in various scientific fields taken into account by the scholars and scientists on board.

1. From an initially political-commercial project to that of a voyage of discovery

This voyage was first envisaged by Claret de Fleurieu, Director of harbours and naval shipyards, to serve France's political and trade interests (Gaziello, 1984).

Aware of Cook's discoveries in the Pacific, including those related to the fur trade between North America and China, Claret de Fleurieu's first plan had an economic orientation. It particularly dealt with finding French trade outlets in the Far East (Japan and China). Through this seach, he meant to get ahead of the English in all the new fields of maritime trade, both relating to whaling on one hand and the fur trade on the other. To do so, the voyage's project took on a political bent and was extended to:

- Surveillance of British activities in distant seas,
- Studying the Dutch, Spanish and Russian possessions,
- Finding ports of call for French ships.

In addition, in his report entitled «Project for a discovery cruise», written in February 1785, Fleurieu mentioned the need for the French to take part, as had the Portuguese, Spaniards and Dutch, in discovering new sea routes. In this context, he emphasised the contribution that Cook's voyages had made to global knowledge (Girault de Coursac, 2000).
The corollary was his proposal to Louis XVI to pursue and perfect Cook's work, through a far-reaching voyage of discovery. Fleurieu, who was not only a good sailor and one of Bougainville's former companions, but also a scholar and geographer and member of the Royal naval academy, became the main initiator and organiser, alongside the King Louis XVI (Gaziello, 1984).

2. A voyage decided on and co-organised by the King Louis XVI

Fleurieu's project was naturally favourably received by the King. This was due, not only to the general climate at the time, which was particularly propitious, as we saw at the launching of maritime expeditions, but also to his passion for geography, the sea and voyages of discovery (Girault de Coursac, 2000). This passion was first of all, the result of his early scientific training in physics, chemistry, geography and hydrography. From the age of eight, dozens of maps and charts from all over the world were available to him. Along with these subjects, English should be added. He learned to read it through the adventure story of Robinson Crusoe. His tutors were careful to prepare him, as the future King, to:

- Become an enlightened protector of science and scholars in this age of great scientific progress,
- Restore a fairer position for France, with respect to England, worldwide, and particularly on the seas.

His scientific training, supported by prestigious masters, continued even after he was married. Once king, in 1774, he continued to cultivate his passion for laboratories and scientific cabinets as well as for libraries. The latter, held many scientific works, but also travel stories of great navigators such as Cook. Louis XVI's passion for this great navigator's discoveries, predisposed him, not only to accept Fleurieu's proposals, but also to invest himself personally in the framing, defining and organizing of the expedition project.

As regards the framing aspect, he ordered that Fleurieu's project be limited to those parts of it which were, firstly, most useful to France, and secondly, achievable in the allotted time.

For the programme's definition, he himself wrote a two-hundred page report, based in part on reports from Learned societies (Royal academy of sciences, the Society of medicine and the Naval academy) which he had received by order. The order to the Royal academy of sciences, for example, stipulated that the expected report should indicated the most important observations which should be made during this voyage undertaken in the aim of making science progress. Notably, this resulted in the proposal to collect the following data in every region of the world crossed by the expedition (Girault de Coursac, 2000):

- **Hydrographical data:** salinity and water temperature measurements taken at different depths, as well as current velocity and tidal ranges. To accomplish this, it was recommended that thermometers, floats and devices to measure water depth be taken aboard,

- **Meteorological data:** the air's make-up was to be measured in various parts of the world and at different latitudes. To this end, it was recommended that aerostatic balloons be used.

- **Geological, zoological and botanical data:**

    - Data related to the study of all the shellfish on a given coast, surveying which species was predominant, as well as that of fossils, comparing fossilised and live shellfish.
    - Collecting seeds of grasses and trees which could adapt in a temperate climate.

- **Anthropological data:** detailed anthropological examination, including their measurements, of the peoples encountered.

On the basis of these recommendations, Louis XVI defined the objectives for the expedition's scientific programme and presented them under the following title in part of his report: «Operations related to astronomy, geography, navigation, physics and the different branches of Natural History».

Beyond the definition of the objectives to be reached, in his paper, Louis XVI also emphasised the importance of:

- **The accuracy of the measurements** and plotting required to establish maps and charts. To this end, he asked that the ship's clocks be monitored as exactly as possible,
- **The quality of data collection**, imposing that a double record be made of data: raw data, on the one hand and processed data on the other,
- **the rational classification of data and objects collected**: classified by order, numbering and labelling of objects, then recording in catalogues.

His instructions also focused on:

- **The respective responsibilities of the different categories of scientists and scholars on board**. Thus, he required that the astronomers provide the geographers with the geographical positions they might need and that hydrographers would carry out the necessary plotting and measurements using these data.
- The ways of approaching native peoples on land, and of treating them as humanistically as possible.

As the chief initiator of the scientific programme, he also set out the **top ranking political and trade objectives for the expedition.**

- In political terms:

    - Limiting the reconnaissance programme to four major zones (Fig. 4):

    - Northwestern North America,
    - The China Sea and the Sea of Japan,
    - The Solomon islands,
    - New Holland

  - To make an inventory of the forces and all types of exchanges between France's friendly or rival powers and the lands in the above-mentioned zones.

- In commercial terms:

  - Focus on studying the potential of whaling (Southern South America) and exploiting the fur trade (North America),
  - Study the possibility of setting up ports of call and trade posts in the lands visited.

  To implement this programme, on Fleurieu's recommendation, Louis XVI appointed La Pérouse as the Commander in Chief of the expedition. The latter was a well-known and energetic seaman, as well as a highly experienced and popular Captain (Dunmore, 1986; Jacob, 2000).
  With the King's agreement, he chose Captain Fleuriot de Langle to be his second in command.

  De Langle, beyond being his friend, had worked with the Academy of Sciences and possessed the desired scientific preparation which La Pérouse was lacking (Dunmore, 1986). Morover, he was one of the most remarkable scientific officers of his time (Dunmore, 1986).

3. A highly rigorous preparation for the expedition

The rigour of this preparation, which took several months, was particularly characterised by:

- The choice and fitting out of the vessels and the preparation for their maintenance for nearly four years,
- The care devoted to the supplies of provisions, food, clothing and essential products for the health of the men aboard,
- The choice of these men,
- The choice of the instruments and documents to be used for the scientific mission.

As concerns the choice of ships, they took those of Captain Cook as models: short but broad vessels which could hold, not only the crew, provisions and equipment required for an expedition lasting several years, but also the scholars, their instruments for measurement and their collections (Gaziello, 1984).

Moreover, in order to chart the coastlines, these ships had to be able to come close to the coast and sail in shallow bays.

For these reasons, amongst others, the choice of two 500-tonne store ships was made. They were about forty meters long and ten meters in breadth. To suit the Navy's code of ethics, they were redubbed «frigates» and given the names of «La Boussole» and « l'Astrolabe ». Not only were both vessels entirely overhauled and repaired. After being caulked, their hulls were lined with wood. This arrangement was to protect them from shipworms. Their masts were replaced and modified to improve their handling. Spare masts and sails were provided, as well as pulleys, oars, cables, ropes and anchors. Many fittings were made in the holds, for the portholes and galleys. Inter alia, these aimed to:

- Organise judicious storage of provisions and material to be taken aboard,
- Ensure the best possible ventilation in the vessel's steerages, particularly for health reasons,
- Fit out the galleys in such a way that cooks, bakers and scholars could work there at the same time. They had a device to distill seawater.

Finally, small tender craft (launches) mainly intended for shore reconnaissance, were taken on board broken down into spare parts, for later assembly (Gaziello, 1984).

Food provisions were vital to keep the men in good health on such a long expedition. Therefore, La Pérouse was careful to take as many fresh, high quality products as possible (flour to last two years; wheat and buckwheat to be milled on board; salted butter; fruit and vegetables; live cows, sheep, pigs and poultry, etc.). They also planned to take on new supplies at their calls. With this perspective, he also loaded items to exchange, choosing them with the experience of Cook in mind (hatchets, combs, pins and various objects which could appeal to the natives).

The latter's experience was also drawn upon in choosing to take anti-scurvey products on board (malt or barley flour used to make beer; leaven; salts to fight scurvey like sorrel, chinchona, etc.). Great attention was given to making anti-scurvey potions according to the model recommended by Captain Cook.

As for garments, spare clothing and shoes were taken in order to brave the different climates expected. To this end, large amounts of cloth and leather were loaded on board. The cloth would be used to make waistcoats, breeches, shirts and stockings. It should be noted that the additional boots, stockings, frockcoats and waistcoats for the crew were paid for by the King (Gaziello, 1984).

In addition to the care taken in terms of fitting out the ships and their provisionning, great care prevailed in **choosing the men**:

- **The crew members**, mostly from Brittany, were chosen for their physical strength and their character, which made them capable of sailing for long periods without protesting,

- **The officers**, for whom the criteria which determined their selection was their motivation to take part in a long-lasting expedition of discovery. Other criteria were their scientific knowledge, their technical abililities, their physical condition and their mental stability,

- There were two **engineers**, chosen by the Commanders, including a chief engineer (Monneron) and a geographer-engineer (Bernizet). Monneron was recruited, not only for his experience at sea, but above all for his passion for voyages of discovery. The two engineers were assisted by Guéry, who was an armourer-watchmaker,

- **The scholars** were selected amongst the applicants who had been approved by the Academy of Sciences.

For the entire expedition, they were the following:

  - 2 astronomers: D'Agelet and Monge (who had to disembark at Tenerife due to health problems),
  - 1 physicist: Mongez (editor of the «Journal de Physique» as well as being a canon at Sainte Geneviève),
  - 3 naturalists: de Lamanon (geologist, meteorologist and physicist), Father Receveur (naturalist and chaplin) and Dufresne,
  - 2 botanists: de La Martinière (botanist and physician) and Collignon (the expedition's gardener).

The team of scholars was assisted by **three artists**:

  - Duché de Vancy, in charge of drawing the «figures and landscapes» appears to have been influenced by the painter Watteau (Gaziello, 1984), or by David, who was to finish his famous painting «Oath of the Horatii» and whom he had probably met in Rome (Dunmore, 1986),

  - Prévost (Guillaume), specialised in drawing plants and who refused to draw any samples other than botanical ones,

  - Prévost (Jean-Louis Robert), the nephew of the former, also a botanical artist, but he accepted to make drawings of the zoological samples taken.

Along with these choices, was added **an interpreter of Russian**. He was chosen, with the King's agreement, by the Naval Minister de Castries. It was Barthélemy de Lesseps, whose father was Consul General in Saint Petersburg. He was in charge of leading the forseen negotiations with the Russians at Kamtchatka.

In all, upon its departure, **the expedition accounted for 220 men**.

To support the scientific mission, a large amount of scientific equipment, maps, charts and books were taken.

Part of the scientific equipment was purchased by and another part borrowed by La Pérouse, notably from the Academy of Sciences and the Naval Academy (Gaziello, 1984).
Amongst the main **instruments taken on board** were: 8 clocks, 1 chronometer, 2 dipping compasses (loaned by the English physicist Joseph Banks, Cook's companion), and all the equipment required to set up a true portable observatory.

The equipment also included: telescopes, 2 night telescopes, 3 sextants, 2 theodolites, 4 navigational compasses, azimuth compasses, 1 pantograph, two barometers and 4 thermometers (Gaziello, 1984; Girault de Coursac, 2000; Bellec, 2001).

Along with these instruments to observe and measure, La Pérouse loaded a selection of seeds and trees to be planted in the lands visited. This cargo in question contained a hundred bushels of seed, as well as 59 trees and shrubs which had all been selected by the King's Gardener.

Finally**, a highly impressive library** was also provided for on board for the scientists (Gaziello, 1984). It included, for instance:

◦ 28 discovery voyage stories,
◦ 23 books on astronomy,
◦ 8 books on physics,
◦ 24 books on natural history.

At the beginning, upon La Pérouse's request, the ship's library was based on collections from the charts and plans repository of the Royal naval academy. Along with this shared library which had at least 51 volumes, with prominence give to the accounts of Cook's and Bougainville's travels and the Encylopaedia of Diderot, as well as the books brought by the scholars themselves (Gaziello, 1984; Dunmore, 1986).

Amongst the latter, for instance, was De Lamanon, who was a physicist, mineralogist and meterologist, spent nearly 6,000 pounds (or the equivalent

of two years' salary for a merchant navy captain) to make up his own shipboard library.

The library contained not only books, but also a rich collection of charts and maps. The most important chart showed the «Great Ocean» divided into three «Austral», «Equatorial» and «Boraal» zones and had been specially designed for the expedition on the basis of the best existing French, Spanish, English and Dutch charts of the time. The known routes of all navigators, both ancient and contemporary, were plotted on it. Along with the chart was added a compendium of thirty-seven other charts of the less travelled parts of the «Great Ocean».

All these elements of logistic support for the expedition show how attentively it was prepared, with a constant concern to doing as well as Cook had. The overall budget spent for this purpose was a million Pounds, entirely financed by the State.

4. Difficult implementation of the scientific mission

The main difficulties arose from the **lack of experience** on the part of the scholars for long-lasting voyages. Moreover, though unfamiliar with military discipline, they had to bear its consequences,

They discovered the **difficult living conditions on board** immediately upon embarking in Brest harbour. Having left the lustres of the Castle of Versailles where the Navy Minister had given a dinner in their honour just a few days earlier, they found themselves on the decks of the two vessels, in the midst of a stupefying bustle and congestion (Dunmore, 1968). In addition to the packs and kit piled in every corner of the steerage, the decks themselves ressembled farm yards.

On each ship there were five cows attached to the main mast, some twenty pigs grunting in the pens between the guns, and about twenty sheep bleating in the rowboats. This deckside cohabitation extended to two hundred poultry (hens, ducks, turkeys and geese), brought on board in cages which were lined up along the catwalks near the Gardener's plants. Everywhere were heaped sacks of potatoes, beans, cabbage and fruits and nets to fish for tuna were hanging from the shrouds (Gaziello, 1984).
And beyond the picturesque scene they discovered on deck, they would have to familiarise themselves with very rough accommodations. Indeed, the store ships were cargo vessels which did not have passenger cabins. Therefore, temporary accommodation was fixed up either in the corridor passages, or in one of the larger rooms on board, which was divided into four or five cubbyholes using sailcloth and dubbed, for the occasion, the «scholars' room». The scholars would have to work and sleep in these tiny spaces for several months, or even years. This situation progressively improved during the expedition, following the

dissappearance of a dozen officers who had drowned or been massacred (Gaziello, 1984).

On board, as on every ship, the days were punctuated by meal times. Those of the officers, where the scholars were also to take part, took place at 9 am and 4 pm. The lunch and dinner were made up of cold meat, or soup, starchy vegetables accompanied by fresh bread and coffee. It was the Staff's privilege to have bread and coffee every day. Their daily fare was much better than that of the seamen, who ate meat, salted fish and so-called «biscuits, or sea-bread», accompanied with large quantities of wine, in which they dipped the biscuits (whose quality varied greatly depending on how well the grains taken on board had kept). Moreover, the officers enjoyed live supplies and could improve their fare with their personal stocks which they had brought along in their baggage.

For the scholars, the long days at sea under these conditions must have been particularly hard. Most of them, with the exception of the astronomers and the geographer, could only make progress in their work during the calls and stopovers.

Except for reading, writing or drawing, they were often reduced to idleness and inactivity (Gaziello, 1984). Ten days at sea seemed like one hundred to them. Therefore, they awaited the calls and the related excursions, with impatience. However, sometimes their expectations were dashed. This was, for example, the case when Lamanon discovered that the expedition's budget did not provide for funding to hire the guides and mules he needed for missions on site. This progressively resulted in strained relations aboard between the scholars and La Pérouse. These tensions reached their height in Macao, where Lamanon headed a conspiracy. He led most of the scholars to leave ship, without saying where they were going. It followed that when they returned to the boat, they were put under arrest for twenty-four hours. Even the Father Receveur was no exception.

These events only increased **La Pérouse's resentment towards the scholars**. He wrote the following in one of his letters to the Navy Ministry: «Scholars are a class of man so full of self-esteem and vanity, that it is highly difficult to lead them during long cruises. I have, however, managed to make them put up with each other, which is no little task» (Jacob, 2000).

In spite of the difficulties encountered in performing the scientific mission, and above all, of the expedition's disappearance, the results obtained in the Pacific were nevertheless significant. We shall briefly review them here:

5. Important results

The results obtained throughout the expedition were, as we have seen, collected on a rigorous, daily basis, according to the methods strictly set out in the instructions received from King Louis XVI. La Pérouse himself kept a «log

book», which remained on the ship up to the sinking and disappeared with him. Luckily, he had taken every opportunity during calls to send the Minister copies of the chapters of his log along with his letters, reports, charts and drawings. It was the very careful transmission of these copies, the last part of which was sent from Botany Bay, which enabled Milet-Mureau to print the «Official account» of La Pérouse's voyage in 1797 (Gaziello, 1984).

The results of the scientific mission are known to us, particularly thanks to the in depth study made on the subject by C. Gaziello (1984). This author showed that the mission's main **contributions to knowledge of the Pacific concerned mapping, geography and botany.**

As for mapping, the progress made was firstly, in terms of methodology. La Pérouse conclusively validated the method to calculate longitudes used by Cook. Use of the astronomical method, combined with that of chronometers, made it possible to acheive accurate drawing up of charts and maps. This accuracy was based, not only on that of the method based on calculation observations, but also on the joint use of existing charts and documentation. It enabled La Pérouse to undertake an **important work of revising existing charts**, and in many cases, removing islands which had been wrongly identified by his predecessors from them. One example of this was the revising of the chart drawn up during Admiral Anson's voyage to the Sandwich islands. This entailed eliminating what Anson had called the Spanish isles, which were in fact the Sandwich islands.

Along with revising existing charts, was the **collecting of a large quantity of geographical observations** which were very finely illustrated, as shown by the official account of La Pérouse's voyage round the world published by Milet-Mureau. By doing so, he made a major contribution to knowledge about the lands visited, including their environment and their inhabitants.

Beyond this **outstanding contribution in terms of Human and social sciences**, was the **foremost role** it **played in discovering and surveying new Coasts**, including those of:

- Part of Northwestern America, for which he completed the mapping done in part by the Spaniards and by Cook. However, hindered, as his predecessor had been, by fog and mist, he was unable to complete it.

- Japan and Tartary, for which he drew up the first accurate map,

- Formosa, islands in the China Sea, and above all, the island of Sakhalin, whose existence was hardly known previously. By doing so, he discovered the Strait separating Sakhalin from Hokkaido: a strait which was named after him.

In order of importance, and following the geographical and mapping results, came **the botanical discoveries**.

Like the «ship's log» kept by La Pérouse, during the expedition, the letters, drawings and specimens of seeds and plants were sent to the King's Gardener in France by the botanists Lamartinière et Collignon.
The former of these, an unflagging explorer, took numerous observations, compared his results to the knowledge which had been acquired and classified his specimens in consequence. He also had Guillaume Prévost draw the new plants found and for example, sent the King's Gardener twenty-three sorts of seeds from the Canary Islands which were not grown in France. Furthermore, he sent the Academy of sciences a report on botany and minerarology.
Lastly, with Collignon, he gathered information about the plants used in the countries where they landed and on how they were prepared. Amongst other examples, this was the case for a plant from Chile which supplied an excellent flour.

As for Collignon, he proceeded to gather seeds and roots to be sent to France, and was also careful to plant the seeds, plantlings, shrubs and trees brought from France at his calls. He was, among those aboard the vessels who were working in botany, the person whose activity was the greatest and the most useful.

As regards **the activity of the other scholars, naturalists and physicists**, most of their work is lost to us. This is probably due to the fact that they did not transmit their results regularly during calls and that, above all, their notes and collections disappeared when the ships sank.

However, we do know that **they carried out a range of studies**, including:

- A paper on «marine animals» and an essay on «the language of the indians at Monterey», prepared and sent to France by Lamanon,

- A reflection by Mongez on «seabirds' beak movements» and thoughts about a new category of feldspar. They were sent by him to the Academy of sciences.

At the time, transmitting reports from the expedition was a true challenge, and sometimes considerable risks were incurred to do so. For instance, this was the case in the context of Barthélémy de Lesseps, the Russian interpreter, who was charged by La Pérouse to act as a courier.
His mission was to take part of the expedition's report from Kamtchatka to Moscow. As we shall see later, it was transformed into a heroic voyage which symbolised the extraordinary efforts devoted to transmitting of data.

6. An exceptional concern for the information being transmitted to the King

The regular sending of scientific results to France, from the various points of call, has been mentioned above. Throughout the expedition, La Pérouse was careful to entrust these shipments to trustworthy people, including other ships' commanders met during calls, or members of the diplomatic representatives set up in the ports where they put in.
Four consignments were sent from Manila, Paca, Petropavlosk and Botany Bay.
The most unusual of the four was that of Petropavlosk (Kamtchatka), where de Lesseps disembarked upon La Pérouse's request, with the mission to take the reports and letters to Moscow.

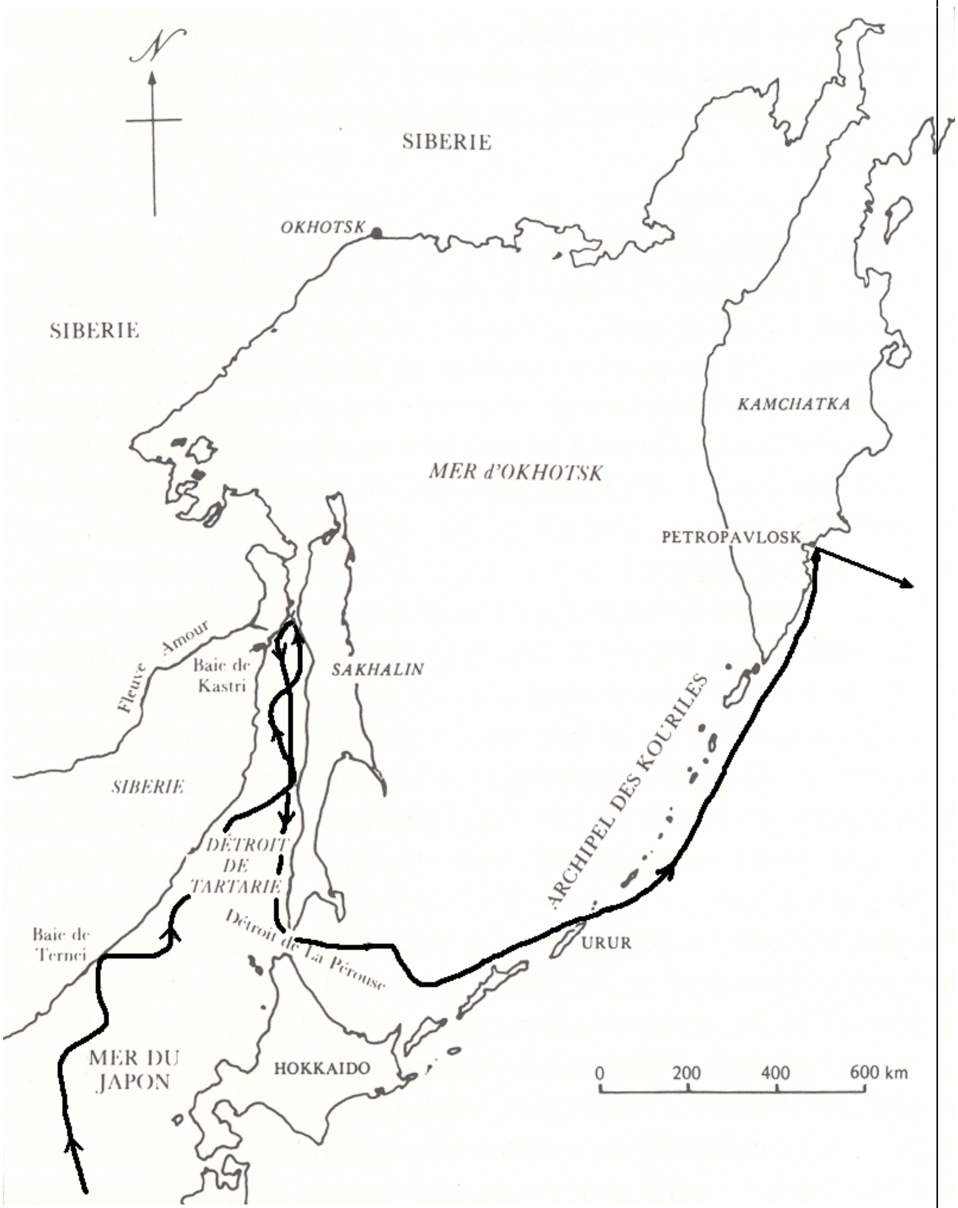
After the departure of «La Boussole» and «L'Astrolabe», on 6 September 1787, from the port of Petropavlosk, which was the only town in Kamtchatka and the only Russian port on the Pacific, Lesseps started out on his trip across Siberia and Russia in early October. This was a veritable epic (Dunmore, 1986).
He first set out Westward to cross the Peninsula of Kamtchatka. He took fifteen days to cover 150 kilometers, then he had to build a raft to cross a river.

Next, in this snow-covered region where villages were only linked by footpaths, he waited until late January 1788 for a convoy of sledges to be organised. In February, he headed towards the North of the Peninsula of Kamtchatka for over 1,000 kilometers, to the northern coast of the Sea of Okhotsk (see Fig. 8; Dunmore, 1986). From there, he went along this coastline towards the Southwest, to reach the town of Okhotsk in May 1788. Then, seeing that the thaw made the sleighs impracticable, he bought horses and left for Yakoutsk, a town located 1,000 km away, before continuing on across Siberia towards Irkoutsk. From Lake Baikal, he went back towards the Northwest by coach, up to Krasnoiarsk, then travelled to Moscow via Novgorod. He arrived in Moscow on the 22nd September 1788, after a year-long voyage.

In accordance with La Pérouse's instructions, he turned over his parcels to the French Ambassador. However, the latter, who had been ordered to send it to Paris, forced Lesseps to continue his journey. He left via Riga, Konisberg, Berlin and arrived in Paris on 17th October. Being expected at Versailles by the new Minister of the Navy, Luzerne, he was immediately taken before Louis XVI. The King ordered that the account of the voyage be printed, once it had been completed.

This episode of the expedition, which would deserve having an entire book devoted to it alone, was not only the perfect illustration of La Pérouse's exceptional determination to fulfil his commitments to the King, but also of his rigour and even more so, of the outstanding courage of the men of the time. Their example makes us think and commands our admiration.

Fig. 8 : La Pérouse's voyage in the north western part of the Pacific Ocean (1785-1788)



THE REASONS FOR CHOOSING A SYMBOL FOR THE NAME OF THE MARINE DOCUMENTATION CENTRE IN BREST.

The paper above has highlighted, not only the importance of what La Pérouse's voyage of discovery contributed to knowledge about the Pacific Ocean, but also its exceptional social and political context and the values and symbols that can be linked to it.

In terms of the social and political context, **no period was more favourable to developing sciences, launching great maritime expeditions and raising citizens' awareness of how important sciences are, than was the «Age of Enlightenment»**. In this context, as we have seen, dissemination of information through libraries, on the one hand, and the preparation of Diderot's Encyclopaedia, on the other, played a major part, both with the principal intellectual elites and in the middle classes of society. This interest for science, which in some ways revolutionised Society, was also propagated through the Naval Staff, where many officers became seaman-scholars, members of the Naval academy and close to the Academy of sciences.

In this favourable climate for **a high-quality maritime policy** to appear, the King Louis XVI initiated a project for an expedition with universal and encylopaedic ambitions, which could attract the attention of other European countries to France, and to a certain extent, compete with England on the seas. The voyage of La Pérouse, which replicated Cook's voyage and was intended to perfect the knowledge of the «Great Ocean», was not only financed by the State, but also and above all, decided on by the King, who coordinated the preparation in detail. Being keen on marine sciences, he himself defined the specifications and chose an experienced person of very great quality who was La Pérouse, to implement it. **Quality was also the prevailing criterion** in choosing the officers, engineers and scholars who would sail, as well as in the collecting on board and later transmission of data. **Along with this quality, were other values such as enthusiasm, curiosity, perseverence, strong character and of course, courage**, as superbly illustrated by the journey of Barthélemy de Lesseps.

Lastly, amongst the exemplary specificities of La Pérouse's voyage, **the importance given to the on-board libraries should be emphasised**: in our eyes, this importance is highly symbolic of the quality of resources taken aboard and the support for the ambitious programme of research and reconnaissance which La Pérouse was entrusted with.

The appeal of the context and the exceptional nature of La Pérouse's expedition led the Board of Directors of the Marine documentation centre in Brest to choose the name of this expedition to name the Centre in July 2003.

The La Pérouse library, built on the shores of the Bay of Brest, whence the expedition set sail from more than two hundred years ago, **is striving to be in turn a symbol of quality and openness to the world, serving research in the field of marine sciences.**

CONCLUSION

The French voyages of discovery which were made in the Pacific Ocean in the 18th century, were both in terms of their definition and of their objectives, preparation and performance**, influenced by the philosophy** of this : a philosophy marked by rationalism and the incentive to acquire scientific knowledge.

They enjoyed great support from the souvereigns on the time, more especially including Louis XVI. The latter, keen on the sea and sciences, was the main initiator of La Pérouse's voyage, a French replica of Cook's voyages.
The expedition was exceptional in many ways, and notably distinguished itself by the extent of the scientific material deployed and by the rigour of the observations and studies carried out. It was the beginning in France of the age of scientific navigation and served as model for the next maritime explorations. However, the latter expeditions no longer shared the universal and encyclopaedic ambitions of that of La Pérouse, which had perfectly reflected the intellectual and scientific climate of the . They were limited, either to a given geographic area, or to a more targeted and limited scientific goal.

The contribution of the French expeditions in the 18th century to knowledge of the Pacific Ocean, were overall, of comparable importance to those of the English expeditions of the time, including those of Cook.
Cook discovered New Caledonia, the Hawaian isles, disproved the existence of "Terra Australis", and explored: New Zealand, the western coast of Australia and that of North America. Before him, Wallis and Carteret had discovered Tahiti, some of the Tuamotu islands and Pitcairn island - French discoveries complemented the charts drawn on previous voyages and made them more accurate, for all these zones. Thanks to the precision brought to calculating longitudes, they made a vital contribution to the revision of charts, and therefore, of the charting of the Pacific. This was all the more essential in that they pursued the exploration begun and made new discoveries. Shortly after Wallis, Bougainville also discovered Tahiti and made this known before his English predecessor did.

La Pérouse continued the exploration of the isles of Hawaii and the western coast of North America. He was the first to enter the China Sea and the sea of Japan, where he began exploring the coastlines and **discovered the islands of Hokkaido and Sakhalin, as well as the strait separating them.**
D'Entrecasteaux reconnoitered Tasmania, the southern coast of New Caledonia, New Ireland and the northern coast of New Guinea.
And finally, Baudin, devoted himself to exploring the west coast of Australia.

All of these discoveries, along with the results of the work done by geographers, botanists and other naturalists, which were made tangible by minutely detailed descriptions of plants amongst other things, and rich collections brought back from the expeditions, did indeed make up an "Ocean of discoveries".

Since the Age of Enlightenment, maritime explorations have continued in the Pacific Ocean. They have enabled us, thanks to technological developments, to know it in great detail, and to note the sea states and climate in quasi-real time.

Improving and enhancing all the reports of expeditions and the related ocean research surveys, not just for the Pacific, but for the World Ocean, could be a topic for international collaboration between our libraries.

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